IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CARRUM TECHNOLOGIES, LLC, Plaintiff, v. FCA US LLC, Defendant.	C.A. 18-1646-RGA JURY TRIAL DEMANDED
CARRUM TECHNOLOGIES, LLC, Plaintiff/Counterclaimant-Defendant. v. FORD MOTOR COMPANY, Defendant/Counterclaimant.	C.A. 18-1647-RGA JURY TRIAL DEMANDED

JOINT CLAIM CONSTRUCTION BRIEF

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Plaintiff Carrum Technologies, LLC ("Plaintiff") and Defendants FCA US LLC and Ford Motor Company ("Defendants") respectfully submit this Joint Claim Construction Brief regarding Claims 11 and 12 of U.S. Patent No. 7,925,416 (the "'416 Patent), Appx 1-11.

I. INTRODUCTION

A. Plaintiff's Introduction

Plaintiff Carrum Technologies, LLC and Defendants FCA US LLC and Ford Motor Company disagree on the threshold question of whether three limitations of claims 11 and 12 of the '416 patent recite sufficient structure as to overcome the presumption that § 112 ¶ 6 applies. Defendants seek to recast the claims into something they are not: amorphous structures untethered to functions recited in the claims. But Defendants own cited evidence shows that "object detection sensor" and "controller" are both known and understood structures and are referred to as such in the '416 patent claims, the '416 patent written description, and generally in the art.

B. Defendants' Introduction

The sole terms in dispute are three limitations of asserted claims 11 and 12 of the "'416 Patent drafted using functional language and the "means" term, which invokes the presumption of construction under 35 U.S.C. § 112(f) (formerly § 112(6)). *See Williamson v. Citrix Online,* LLC, 792 F.3d 1339, 1348 (Fed. Cir. 2015) ("[T]he use of the word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies.") (citing *Personalized Media Communications, LLC v. International Trade Comm'n.*, 161 F.3d 696, 703- 04 (Fed. Cir. 1998)). Carrum attempts to overcome the presumption that § 112(f) applies to the "means" terms by pointing to other language in the claims—the "object detection sensor" and "controller." But those terms refer to structures capable of performing multiple functions, including computer-implemented functions. For example, even assuming that the high-level function of an "object detection sensor" was well known in the art (e.g., detecting an object in a vehicle path), the claim does not describe the structural nature of the recited "means" (e.g., is it

hardware, software or firmware?), or how it relates to or interacts with other components of the "sensor." In short, the recited "means" are nothing more than a generic "black box" description for software or hardware that performs the recited function. As such, the "means" term must be limited to the structure, if any, disclosed in the specification corresponding to the claimed function. *Williamson*, 792 F.3d at 1351.

Carrum has not rebutted the presumption that the "means" limitations of claims 11 and 12 should be interpreted under 35 U.S.C. 112, ¶ 6. Although the claims recite an "object detection sensor" and "controller," those elements are at best generic descriptions of structure within which the claimed "means" reside. That the "object detection sensor" and "controller" were known structures says nothing about the limitations-in-question. The recited "means" could be hardware, software, or some combination within the "sensor" or "controller." And the patent specification does not resolve the issue. The specification merely states "Sensor 220 may include any object detecting sensor known in the art," and "Controller 222 may be a microprocessor-based controller such as a computer." As Dr. Messner testified (Appx 153-156, ¶¶ 35-49), known sensors and controllers were multi-component systems that included hardware and software. The "means" of claims 11 and 12 uses functional language and claim generic black boxes within the "sensor" or "controller." Therefore, § 112, ¶ 6 must apply.

The Patent Office agrees. In the *ex parte* reexamination of the '416 Patent (No. 90/019,010), the Patent Office found that the "means" terms of claims 11 and 12 should be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, ¶ 6. *See* Appx 304 (Sept. 22, 2021 Office Action). The Examiner explained that each of the "means" limitations "invokes 112 6th paragraph since it ***utilizes the term means combined with functional language and is not modified by structural language*** in the claim." *Id.* at Appx 305 (emphasis added).

Consistent with the Patent Office's application of § 112, ¶ 6, Defendants' constructions properly limit the claimed "means" to the corresponding structure actually disclosed in the specification and should be adopted. *See Default Proof Credit Card Sys., Inc. v. Home Depot*, 412 F.3d 1291, 1298 (Fed. Cir. 2005) (Where "one employs means-plus-function language in a claim, one must set forth in the specification an adequate disclosure.").

1. Defendants' Statement of Patent Background

The '416 Patent purports to describe a system and method "for enabling a vehicle having adaptive cruise control to reduce its speed in a turn according to the vehicle's position within the turn as well as ignoring objects detected during the turn that are not in the vehicle's path." '416 Patent, Abstract. The claim terms for construction are in asserted claims 11 and 12, which depend from independent claim 10. Independent claim 10 (reproduced below) recites a "system for use in controlling a vehicle at a vehicle speed" that includes "an adaptive cruise control system," a "**controller**"; at least one "lateral acceleration sensor"; and at least one "**object detection sensor**."

> 10. A system for use in controlling a vehicle at a vehicle speed, said system including:
>
> an adaptive cruise control system;
>
> a **controller** in communication with said adaptive cruise control system and capable of determining when the vehicle is in a turn, said **controller** operative to reduce the vehicle speed according to a vehicle position in the turn;
>
> at least one lateral acceleration sensor for generating a signal corresponding to a vehicle lateral acceleration, said lateral acceleration sensor in electrical communication with said **controller** and operative to detect a change in the vehicle lateral acceleration; and
>
> at least one **object detection sensor** for detecting an object in a vehicle path of the vehicle during the turn, said **object detection sensor** in electrical communication with said **controller**, wherein said **controller** includes control logic operative to determine whether the object is in the vehicle path during the turn and ignoring the object for braking purposes when the object is not determined to be in the vehicle path.

Claims 11 and 12 recite "means-plus-function" elements (in ***bold italics***) for the "object detection sensor" and "controller" of claim 10.

> 11. The system of claim 10 wherein said **object detection sensor** includes

means for generating

an object range signal corresponding to a distance between the vehicle and the object; and

an object angle signal corresponding to the object's angle in relation to the vehicle.

12. The system of claim 11 wherein said **controller** includes both

means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing, and

means for determining a curvature corresponding to a radius of curvature of the vehicle path.

As shown, the claims say nothing about the structural character of the recited "means," except that they are "black box" elements of the "object detection sensor" or "controller."

II. REPRESENTATIVE CLAIMS

"means for generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle"		
Patent Claim(s)	**Plaintiffs**	**Defendants**
'416 patent, claim 11	Carrum does not believe this claim term is subject to construction under 35 U.S.C. § 112(f). In the alternative, Carrum proposes the following structure: "an object detection sensor that generates a range signal corresponding to a distance between the vehicle and a target, and equivalents thereof and an object detection sensor that generates the angle of the target relative to the vehicle, and equivalents thereof."	Construction of this term is subject to pre-AIA 35 U.S.C. § 112(6), now 35 U.S.C. § 112(f). **Function**: "generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle" Structure: Sensor 220 functions (i) for generating a range signal corresponding to a distance between host vehicle 200 and a target, and (ii) for generating the angle of the target relative to the vehicle, and equivalents thereof.
Representative Claim(s)		

"means for generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle"
11. The system of claim 10 wherein said object detection sensor includes ***means for generating*** ***an object range signal corresponding to a distance between the vehicle and the object; and*** ***an object angle signal corresponding to the object's angle in relation to the vehicle.***

"means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing"		
Patent Claim(s)	**Plaintiffs**	**Defendants**
'416 patent, claim 12	Carrum does not believe this claim term is subject to construction under 35 U.S.C. § 112(f). In the alternative, Carrum proposes the following structure: "a controller that uses data to determine an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing and equivalents thereof"	Construction of this term is subject to pre-AIA 35 U.S.C. § 112(6), now 35 U.S.C. § 112(f). **Function**: "measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing" Structure: Sensor 220 functions for generating a target range rate signal corresponding to a rate that the distance between host vehicle 200 and the target is changing, and equivalents thereof.
Representative Claim(s)		
12. The system of claim 11 wherein said controller includes both ***means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing***, and means for determining a curvature corresponding to a radius of curvature of the vehicle path.		

"means for determining a curvature corresponding to a radius of curvature of the vehicle path"		
Patent Claim(s)	**Plaintiffs**	**Defendants**
'416 patent, claim 12	Carrum does not believe this claim term is subject to construction under 35 U.S.C. § 112(f). In the alternative, Carrum proposes the following structure: "a controller that uses data from vehicle sensors to determine the radius of curvature, and equivalents thereof"	Construction of this term is subject to pre-AIA 35 U.S.C. § 112(6), now 35 U.S.C. § 112(f). **Function**: "determining a curvature corresponding to a radius of curvature of the vehicle path" Structure: Controller 222 using data obtained from vehicle 302 to determine a radius of curvature, and equivalents thereof.
Representative Claim(s)		
12. The system of claim 11 wherein said controller includes both means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing, and ***means for determining a curvature corresponding to a radius of curvature of the vehicle path.***		

III. AGREED-UPON CONSTRUCTIONS

CLAIM TERM	PARTIES' AGREED CONSTRUCTION
Claim 10: "according to a vehicle position in the turn"	"according to the position of the vehicle along the curve of the turn."

IV. DISPUTED CONSTRUCTIONS

A. "means for generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle" (Claim 11)

CLAIM TERM	CARRUM'S PROPOSED CONSTRUCTION	FCA & FORD'S PROPOSED CONSTRUCTION
Claim 11: "means for generating an object range signal corresponding to a distance between the	Carrum does not believe this claim term is subject to construction under 35 U.S.C. § 112(f).	Construction of this term is subject to pre-AIA 35 U.S.C. § 112(6), now 35 U.S.C. § 112(f).

CLAIM TERM	CARRUM'S PROPOSED CONSTRUCTION	FCA & FORD'S PROPOSED CONSTRUCTION
vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle"	In the alternative, Carrum proposes the following structure: "an object detection sensor that generates a range signal corresponding to a distance between the vehicle and a target, and equivalents thereof and an object detection sensor that generates the angle of the target relative to the vehicle, and equivalents thereof."	**Function**: "generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle" Structure**: Sensor 220 functions for generating a range signal corresponding to a distance between host vehicle 200 and a target, and for generating the angle of the target relative to the vehicle, and equivalents thereof.**

1. Plaintiffs' Opening Position

Defendants seek to use § 112(6) to narrow claim terms with a definite structure to benefit their infringement position.[1] The text of § 112(6) and the Federal Circuit's case law is clear that when a claim term contains a sufficiently definite structure—as the '416 patent claims 11 and 12 do—the means-plus-function presumption can be overcome. Even if the claims should be construed under 112(6), the Defendants proposed structures are overly narrow and will be confusing to a jury.

(a) The Proposed Claim Term Recites Sufficiently Definite Structure to Overcome the Means-Plus-Function Presumption

Means-plus-function claiming is used "without the recital of structure." 35 U.S.C. § 112(6). It is an alternative means for claiming a patented invention that "allow[s] patentees to express a claim limitation by reciting a function to be performed rather than by reciting structure for performing that function." *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347 (Fed. Cir. 2015). When a claim term

[1] Because the '416 patent is pre-AIA, it is § 112(6)—rather than § 112(f)—that applies. However, substantively, there is no difference and § 112(f) cases are equally applicable to the § 112(6) analysis.

includes the word "means," the term presumptively is construed as a means-plus-function limitation. But that presumption is rebuttable if the term connotes sufficient structure. The Court must look to "the meaning of the language of the limitation in assessing whether the presumption is overcome." *Id* at 1348. "The standard is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Id* at 1349. "The ultimate question is whether 'the claim language, read in light of the specification, recites sufficiently definite structure to avoid § 112, ¶ 6.'" *MTD Products Inc. v. Iancu*, 933 F.3d 1336, 1342 (Fed. Cir. 2019) (citations omitted). Here, each claim term provides sufficient structure to overcome the presumption that § 112(6) applies.

All three terms (across two claims) that Defendants seek to construe using 112(6) already contain a sufficient and definite structure; therefore, the means-plus-function presumption is overcome. *See TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1261 (Fed. Cir. 2008). Claim 11 recites an object detection sensor as the structure that performs the function: "The system of claim 10 wherein said ***object detection sensor*** includes means for generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle." Appx 11, '416 patent at 9:17-21 (emphasis added). Similarly, claim 12 recites a controller as the structure that performs the function: "The system of claim 11 wherein said ***controller*** includes both means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing, and means for determining a curvature corresponding to a radius of curvature of the vehicle path." *Id.* at 10:1-6 (emphasis added). And the independent claim 10 upon which claim 12 depends is instructive as to the structure of this controller: "a controller in communication with said adaptive cruise control system and capable of determining when the vehicle is in a turn, said controller operative to reduce the vehicle speed according to a vehicle position in the turn." Appx 10-11, '416 Patent at 8:63-9:2. A person of skill in this art

understands what sensors and controllers are. A sensor is a device that detects or measures a physical property. A controller is a widely recognized structure that establishes and executes limits of performance. Both are sufficiently definite structures set out in the claims such that § 112(6) does not apply.

(b) Object Detection Sensor Is a Known and Definite Structure

Claim 11's language itself provides sufficient structure to perform the function: an object detection sensor. It is that described object detection sensor that performs the functions of generating an object range rate signal and an object angle signal: "***said object detection sensor includes means*** for generating an object range signal … and an object angle signal."[2] *Id.* at 9:17-22 (emphasis added).

It is exactly this type of claim language that can transform what would otherwise be means-plus-function claim language into a sufficiently definite structure. For example, when claim language "denotes a type of device with a generally understood meaning" in the art, or "describe[s] a class of structures," it describes sufficiently definite structure. *Compare Greenberg v. Ethicon Endo-Surgery, Inc.,* 91 F.3d 1580, 1583 (Fed. Cir. 1996) ("'detent' denotes a type of device with a generally understood meaning in the mechanical arts") *with Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1300 (Fed. Cir. 2014) (overruled on other grounds) (the claim "may describe a class of structures"). Both are the case here. A sensor satisfies both. It is a widely understood class of structures and an object detection sensor is one that has a generally understood meaning in the automotive industry.

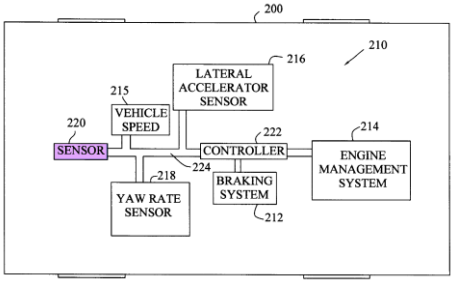
A sensor has a widely understood plain and ordinary meaning—both to a person of ordinary skill in the art and to average person. Declaration of Gregory Shaver, Ph.D. ("Shaver Decl."), Appx 16-19 at ¶¶ 25-29. In fact, most people interact with and recognize sensors every day—whether it is

[2] Though claim 11 refers to "said object detection sensor," claim 10 makes clear that the system includes "at least one object detection sensor." *Id.* at 9:8-22. Therefore, it is possible that there is more than one object detection sensor, and each object detection sensor performs one of the functions described in claim 11.

their car indicating speed or a thermometer indicating temperature. Both common dictionaries and technical dictionaries reflect this common understanding that a sensor is a device—a physical structure—used for the detection and/or measurement of a physical property—such as object range or object angle. *See, e.g.*, Appx 117, Oxford Essential Dictionary (2003) (defining "sensor" as "a device for the detection or measurement of a physical property to which it responds"); Appx 121, Oxford American Dictionary and Thesaurus (2003) (defining "sensor" as "a device giving a signal for the detection or measurement of a physical property to which it responds"); Appx 124, McGraw-Hill Dictionary of Scientific and Technical Terms, 6th Ed. (2003) (defining "sensor" as "the generic name for a device that senses either the absolute value or change in a physical quantity such as temperature, pressure, flow rate, or pH, or the intensity of light, sound, or radio waves and covers that change into a useful input signal for an information-gathering system; a television sensor is therefore a sensor, and a transducer is a special type of sensor."). These definitions are consistent with technical texts and the way a person of ordinary skill in the art would read that term. Shaver Decl., Appx 16-19 at ¶¶ 25-29.

The ubiquitous meaning of a sensor is as a physical device that has sufficient structure to overcome means-plus-function construction under § 112(6). For example, the Federal Circuit held that a vacuum sensor was a sufficiently definite structure. *Budde v Harley-Davidson, Inc.*, 250 F.3d 1369, 1382 (Fed. Cir. 2001) (discussing the district court's finding that vacuum sensors were "well known in the art"). Similarly, in *U.S. Well Services, LLC v. TOPS Well Services*, the court found that the term "thermal sensor," like the word "'detector' in *Personalized Media Communications, LLC v, Int'l Trade Comm'n,* 161 F.3d 696 at 704-797 (Fed. Cir. 1998), and 'circuit' in *Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311 at 1319-21 (Fed. Cir. 2004), connotes sufficiently definite structure to avoid invoking Section 112(6)." No. 3:19-cv-00237, 2020 WL 9439469 at *19 (S.D. Tex. Sept. 18, 2020). Here too, the object detection sensor is of sufficiently definite and known structure to avoid § 112(6).

The written description similarly supports that the object detection sensor is a structure and ties it to the functionality described in the claim. Throughout the written description, including the summary of the invention, the '416 patent highlights the object detection sensor(s) as devices that perform the claimed functionality. *See, e.g.*, Appx 8, '416 patent at 3:26-27 ("at least one object detection sensor"); 4:23-27 ("System **210** also includes sensor **220** for generating a range signal corresponding to a distance between host vehicle **200** and a target, and a target range rate signal corresponding to a rate that the distance between host vehicle **200** and the target is changing.") (emphasis added); 4:56-65 ("Sensor **220** may also be used in some embodiments of system **210** to gather additional information useful to controller **222** in determining the threat of the object to vehicle **200** and the appropriate actions to carry out. This additional information includes the target angle of the object relative to vehicle **200** and the yaw rate of the object relative to vehicle **200**.") (emphasis added). Figure 2 of the patent (Appx 3)—which shows the interaction of various structural systems within the vehicle—indicates that Sensor 220 described above is a defined structure (highlighted in purple right). Appx 3, '416 patent at Figure 2; Appx 8, '416 patent at 3:34-35.



Even Defendants' own proposed "structure" definition does not add any additional structure beyond the word sensor. Defendants propose that the "structure" for claim 11 be construed as "***Sensor 220*** functions for generating a range signal . . . and for generating the angle of the target." *Supra* at IV; D.I. 66 (emphasis added). Though the Defendants construction attempts to artificially limit the claims to "Sensor 220," it also implicitly admits that a sensor is a structure that a person having ordinary skill in the art could identify without issue. Because the claim already recites this exact structure—the object detection sensor—Defendants' admission that a sensor is structural and performs the function is evidence that no further means-plus-function construction is required.

The specification and Defendants' own construction reinforce what common sense teaches: the object detection sensor identified in claim 11 is a sufficiently definite structure to overcome the presumption of 112(6). *See Kit Check, Inc. v. Health Care Logistics, Inc.*, No. 2:17-cv-1041, 2019 WL 4142719, *11 (S.D. Ohio Aug. 30, 2019).

(c) Defendants' Proposed Structure Is Too Narrow and Confusing

Even if the Court were to decide that the claim 11 term (or the claim 12 terms) were subject to further construction under 112(6) (though they are not), Defendants' proposed constructions are nonsensical and overly narrow compared to the written description's teachings and the clear text of the claims.[3] Claims 11 and 12 already contain a structure to perform the described function and the written description does not require cabining the structure to include random numbers that would be gibberish to a jury.

One of the purposes of claim construction is to ensure that the jury understands what the patentee covered in its claims. *See Abbott Labs. v. Sandoz Inc.*, 544 F.3d 1341, 1360 (Fed. Cir. 2008) (stating that "claims are construed as an aid to the decision-maker, by restating the claims in non-technical terms.") (internal citations omitted); *see also Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1348 (Fed. Cir. 2010) ("The [claim] terms, as construed by the court, must 'ensure that the jury fully understands the court's claim construction rulings and what the patentee covered by the claims.'") (internal citations omitted). Defendants' constructions would make the claims more difficult for the jury to understand—instead of the phrase "object detection sensor" using "sensor 220" and instead of "controller" using "controller 222"—and there is no requirement of means-plus-function construction that compels such a result.

[3] Though the parties disagree about whether 112(6) should apply—or the proper construction of the claims should 112(6) apply—there is no disagreement that the specification discloses sufficient structure that corresponds to the claimed function. *See Williamson,* 792 F. 3d at 1351; *See also supra* at II and D.I. 66.

If this Court determines that the claim 11 and claim 12 terms are drafted in means-plus-function format and 112(6) applies, the next step is to "review the specification to identify the structure that performs the claimed function(s) and thus 'corresponds to' the claimed means." *MTD Products*, 933 F.3d at 1344. Here, the patent specification provides extensive support that Defendants' constructions are too narrow, and that Carrum's constructions are appropriate.

Carrum proposes a structure definition of "an object detection sensor that generates a range signal corresponding to a distance between the vehicle and a target, and equivalents thereof, and an object detection sensor that generates the angle of the target relative to the vehicle, and equivalents thereof." The description of the object detection sensor—the structure in Carrum's construction—in the patent matches with functionality proposed by Defendants.[4] Moreover, Defendants' "Sensor 220" construction is overly narrow, ignores the broader language in the specification, and would be confusing to a jury.

The written description is clear. Sensor 220 generates "a range signal corresponding to a distance between host vehicle **200** and a target" and a signal corresponding to "target angle of the object relative to vehicle **200**." Appx 8, '416 patent at 4:12-29, 4:53-65. There is no question, and no dispute, that the descriptions in the specification directly link a sensor to the functions described in the claims. But more importantly, Sensor 220 is given that number to make understanding the proposed embodiments and figures easier because there are multiple sensors involved. *Id.* at 3:45-4:3 ("Corresponding reference characters indicate corresponding parts throughout the several views . . . the embodiments set out herein illustrate embodiments of the invention in several forms and such

[4] Defendants propose a functional definition of "generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle." *Supra* at II; D.I. 66 at 2.

exemplification is not to be construed as limiting the scope of the invention in any manner."), Appx 3, '416 Patent at Fig. 2.

Sensor 220 is so named to distinguish it from the multiple other sensors discussed throughout the patent, not because that is the actual name of the device. And the patent says exactly that highlighting that "Sensor **220** may include any object detecting sensor known in the art, including a radar sensor (e.g., doppler or microwave radar), a laser radar (LIDAR) sensor, an ultrasonic radar, a forward-looking IR (FLIR), a stereo imaging system, or a combination of radar sensor and a camera system." Appx 8, '416 patent 4:43-48. Defendants seek to substitute the words of the claim that already include the object detection sensor structure with Sensor 220 without taking into account that Sensor 220 is defined as any object detection sensor and is only so named in order to more easily describe the patent examples. Defendants are arbitrarily putting form over meaning when the specification makes clear that the structure doing the claimed functions is an object detection sensor. Appx 8, '416 patent at 4:12-29, 4:43-48, 4:53-65 (generally linking Sensor 220 to the claimed functionalities but making clear that Sensor 220 is any object detecting sensor).

Defendants' proposed construction would be overly confusing to the jury and cabin the range of devices claimed. There are many object detecting sensors in the art, including multiple different types of object detection sensors used by Defendants. But what the jury will understand is that each of these devices is performing the claimed functionality—detecting an object. What the jury would not understand is how the precise term "Sensor 220" relates to the specific object detection sensor used by any given defendant. Using the term "object detection sensor" is both supported by the specification and would most clearly convey to the jury what Carrum invented and claimed. *See Power-One*, 599 F.3d at 1348.

2. Defendants' Answering Position

Means-plus-function claims are those that invoke the term "means" or, in the absence of that term, recite a function without sufficient structure for performing the function. *Advanced Ground Info. Sys., Inc. v. Life360*, Inc., 830 F.3d 1341, 1347 (Fed. Cir. 2016) ("AGIS"). Pure functional claiming, however, is impermissible. *Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371, 1383 (Fed. Cir. 2009) ("The point of the requirement that the patentee disclose particular structure in the specification and that the scope of the patent claims be limited to that structure and its equivalents is to avoid pure functional claiming.") (quoting *Aristocrat Techs. v. Int'l. Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008)); see also *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 519 (Fed. Cir. 2012) (With no limiting specification disclosure, means-plus-function language effectively claims "everything [] under the sun."). Therefore, the function recited in a means-plus-function limitation must have a corresponding disclosure in the specification—that is, the precise structure, material, or acts (e.g., an algorithm or formula) to perform the claimed function. *Blackboard*, 574 F.3d at 1382-83 ("The description of the algorithm must do more than describe the function to be performed, it must describe how the function is to be performed."); *see also Default Proof Credit Card Sys.*, 412 F.3d at 1298 ("While corresponding structure need not include all things necessary to enable the claimed invention to work, it must include all structure that actually performs the recited function.")

For computer-implemented inventions, the specification must disclose an algorithm for performing the claimed function, which may be expressed "in any understandable terms including as a mathematical formula, in prose, . . . as a flow chart, or in any other manner that provides sufficient structure." *AGIS*, 830 F.3d at 1349 (quoting *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008)); *see also Aristocrat Techs.*, 521 F.3d at 1333 ("[S]imply disclosing a computer as the structure designated to perform a particular function does not limit the scope of the claim to 'the corresponding structure, material, or act' that performs the function, as required by section 112

paragraph 6."). It does not suffice to disclose a generic module or black box without disclosure of structure to "achieve the claimed function," that is, the "algorithm for performing the claimed function." *Williamson*, 792 F.3d at 1352.[5]

Contrary to the controlling authority, Carrum's proposed constructions would merely replace the term "means" with a black box— that is, a generic sub-component of a "sensor" or "controller," and restates the function performed. Under Carrum's constructions, the recited "means" could encompass any sort of hardware, or software that employs any sort of algorithm or formula, which performs the recited function. That is precisely the sort of functional claiming that the Federal Circuit holds subject to § 112(f), and found indefinite in *Williamson*.

Under *Williamson*, 792 F.3d at 1351, the Court must follow a two-step process when construing means-plus-function terms. First, the Court must identify the claimed function. *Id.* (citing *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012)). Second, the Court must determine what structure included in the specification, if any, accomplishes the claimed function. *Id.* As further discussed below, Defendants' proposed constructions reflect this two-step process, and specify ***both*** the claimed function and the corresponding structure disclosed in the specification. Accordingly, Defendants respectfully request that this Court adopt the Defendants' proposals construing the terms under § 112(f).

As a threshold matter, the parties dispute whether the language of claim 11 itself recites sufficient structure to rebut the presumption that invoking the "means" term requires construction under § 112(f). Claim 11 recites that the "object detection sensor" of claim 10 includes a "***means for generating***" two distinct and particular signals: (i) an ***object range signal*** corresponding to a distance

[5] *See also WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999) ("In a means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm.").

between the vehicle and the object; and (ii) an ***object angle signal*** corresponding to the object's angle in relation to the vehicle. According to Carrum, the high-level recitation in claim 10 of an "object detection sensor" provides sufficient structure for each of the generic modules or sub-components that perform the particular signal-generating functions. It does not. As Carrum apparently concedes, claim 11 provides no other description of the structural character of the recited "means"—e.g., whether it is hardware, software or firmware, or how it relates to or interacts with other components of the "object detection sensor."

(a) Carrum Has Not Overcome the Presumption That § 112(f) Applies to the Recited "Means For Generating" Object Range and Angle Signals

First, Carrum argues that the claim language alone recites sufficient structure because asensor is a "widely understood class of structures," and an object detection sensor "has a generally understood meaning in the automotive industry." *Supra* at 9. In particular, Carrum points to the patent disclosure that states that Sensor 220 "***may include*** any object detecting sensor known in the art, including a radar sensor (e.g., doppler or microwave radar), a laser radar (LIDAR) sensor, an ultrasonic radar, a forward looking IR (FLIR), a stereo imaging system, or a combination of a radar sensor and a camera system…" Appx 8, '416 patent at 4:42–46. Carrum argues that means Sensor 220 can be any of those object detecting sensors. But that misses the point.

Even assuming that sensors generally, or object detection sensors in particular, are a known class of structures, that says nothing about the underlying structure of the object detection sensor required to perform the claimed function. *See* Declaration of Dr. William C. Messner, ("Messner Decl."), Appx 153-155 at ¶¶ 35-45. Carrum's expert, Dr. Shaver, offers the unremarkable observation that "An object detection sensor is a sensor, so a physical device, that detects objects positioned in the path of the vehicle." Shaver Decl., Appx 150 at ¶ 25 (This "includes radar sensors, stereo imaging systems, or cameras."). Indeed, the claims recite that the "object detection sensor" is "for detecting

an object in a vehicle path of the vehicle during the turn." However, known sensors at or before the time of the patent filing could provide other functionality, including, e.g., measuring and reporting the position and relative velocity of objects in the rear and front of the vehicle, collecting other object and/or vehicle data, and processing such data to make a determination such as collision threat. Messner Decl., Appx 153 at ¶¶ 35-36. Furthermore, known object detection sensors were complex systems that might include one or more of the following components: a micro-controller, microprocessor or central processing unit; one or more object or target sensors (including, e.g., an infrared (IR), laser or radar sensor), a camera or imaging system, a digital signal processor (DSP); and an antenna assembly. Messner Decl., Appx 153-155 at ¶¶ 35, 37-45. In short, the recitation of an "object detection sensor" alone says nothing about the particular structure within the "object detection sensor" that performs the claimed functions of ***generating an object range signal*** . . . and ***generating an object angle signal***. Therefore, the claim language alone does not provide sufficient structure to overcome thepresumption that § 112(f) applies.

Second, Sensor 220 is the only structure that the '416 Patent describes as performing ***both*** functions of the recited "means"—***generating an object range signal*** . . . and ***generating an object angle signal***. The Court must look to the patent specification to identify the relevant structure, i.e., an algorithm, sufficient to perform the specialized functions recited in the claims. *Williamson*, 792 F.3d at 1352 ("A special purpose computer is required because the distributed learning control module has specialized functions as outlined in the written description."). The specification states: "adaptive cruise control system 210 of the present invention . . . includes ***sensor 220 for generating a range signal*** corresponding to a distance between host vehicle 200 and a target.…" Appx 8, '416 Patent, 4:12–25. The specification describes no structure other than Sensor 220 as performing the claimed function of generating an object range signal. The patent further states: "***Sensor 220*** may also be used in some embodiments of system 210 ***to gather*** additional information useful to controller 222…. This

additional information includes ***the target angle of the object*** relative to vehicle 200…" *Id.* at 4:56–62. Although in some embodiments, other sensors may measure target angle (*see Id.* 4:63-64 ("sensors other than sensor 220 may be provided to measure both the target angle")), Sensor 220 is the only structure that the patent describes as performing the claimed function of "generating" both an object range ***and*** object angle signal.

Third, without structure (i.e., an algorithm) for implementing the signal-generating functions of the claim 11 "means," what is claimed is a generic black box within the claimed "object detection sensors"—in other words, a general-purpose computer or module without the programming necessary to perform the specialized functions. And the Federal Circuit has consistently required that the structure disclosed be more than a general-purpose computer or module, but rather an algorithm for performing the claimed function. *Williamson*, 792 F.3d at 1352 (citing *Aristocrat Techs.*, 521 F.3d at 1333, and *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1367 (Fed. Cir. 2008)). To be sure, the algorithm may be a mathematical formula, inprose, or as a flow chart, or expressed in any other manner that provides sufficient structure. *Williamson*, 792 F.3d at 1352 (citing *Noah*, 675 F.3d at 1312); *see also Sound View Innovations, LLC v. Facebook, Inc.*, No. 16-116-RGA, 2017 WL 2221177, at *2 (D. Del. May 19, 2017), *on reconsideration*, 2017 WL 3444687 (D. Del. Aug. 10, 2017) (any disclosed structure "must be [adequate] to achieve the claimed function" and for "patents claiming a function that a general purpose computer cannot perform, the specification must disclose analgorithm").

(b) Carrum's Alternative Proposal Would Rewrite the Claimed Function of the Recited "Means"

Should the Court agree that the claim 11 "means" limitation is subject to § 112(f), Carrum argues in the alternative that the following structure should be adopted: **"*an object detection sensor that generates a range signal*** corresponding to a distance between the vehicle and a target, and equivalents thereof ***and an object detection sensor that generates the angle of the target*** relative to the vehicle, and equivalents thereof." *First*, Carrum's proposal would allow two different sensors to

satisfy the claimed "means"—a first object detection sensor that generates a target range, and a second object detection sensor that generates a target angle. However, as discussed, the patent describes only one structure, Sensor 220, as performing *both* of the signal-generating functions of the claim 11. And the patentee's use of the conjunctive "and" in claim 11 requires that a single structure perform the recited functions. Thus, Carrum'sproposed construction would effectively read out a limitation of the claim.

Second, Carrum's proposed substitution of two additional object detection sensors for the claimed "means" introduces confusion for the fact-finder, as the "means" itself is a part of the "object detection sensor" of claim 10. The table below illustrates the effect of Carrum's proposed substitutions.

Claim Term	Carrum's Substitutions
Claim 11: "**means for generating** an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle"	"an object detection sensor [of ***said*** object detection sensor] that generates a range signal corresponding to a distance between the vehicle and a target, and equivalents thereof and [*another*] object detection sensor [of ***said*** object detection sensor] that generates the angle of the target relative to the vehicle, and equivalents thereof."

Under Carrum's alternative construction, it is unclear what object detection sensor structure (or sub-substructure) performs the claimed functions—or how the various structures interrelate. In addition, the requirement that a single "means" perform both functions is lost. In short, Carrum's alternative is a blatant attempt to avoid the *quid pro quo* of invoking the "means" term and skirt the requirement that the claim itself recite definite structure.

Because Carrum's proposed constructions fail to identify the structure required to perform the claimed function, the Court should adopt Defendants' construction. As discussed, Defendants' construction specifies ***both*** the claimed function and the corresponding structure actually disclosed

in the specification—namely, Sensor 220 functions (i) for generating a range signal corresponding to a distance between host vehicle 200 and a target, and (ii) for generating the angle of the target relative to the vehicle, and equivalents thereof.

3. Plaintiff's Reply Position

(a) The Structure Recited in Claim 11 Overcomes the § 112 ¶ 6 Presumption

Defendants argue that three limitations across two claims—claims 11 and 12—should be construed as means-plus-function claims. Both claims depend from independent claim 10. As Defendants identify, claim 10 recites a system that includes several structural components including "at least one object detection sensor" and "a controller." *See Supra* at 3. Claim 10 contemplates the object detection sensor and the controller as physical objects saying that "said object detection sensor in electrical communication with said controller." *Supra* at 3; Appx 10-11,'416 patent at 8:63-9:15. This is consistent with how the written description describes the object detection sensor and controller: as physical objects. Appx 8, '416 patent at 4:42-46 (object detection sensor); Appx 3, Fig. 2 (controller); Appx 8-9, 4:66-5:8 (controller).

It is well settled that a claim can overcome the presumption of means-plus-function claiming if the claim recites a sufficiently definite structure. "Sufficient structure exists when the claim language specifies the exact structure that performs the functions in question without need to resort to other portions of the specification or extrinsic evidence for an adequate understanding of the structure." *TriMed, Inc. v. Stryker Corp.,* 514 F.3d 1256, 1259-60 (Fed. Cir. 2008). Defendants' cited cases recognize this. *Advanced Ground Information Systems, Inc. v. Life360, Inc.*, 830 F.3d 1341, 1347 (Fed. Cir. 2016) ("That presumption [of means-plus-function] falls, however, if the claim itself recites sufficient structure to perform the claimed function."); *see also Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015 ("When the claim uses the word 'means,' our cases have been consistent in looking to the meaning of the language of the limitation in assessing whether the presumption is overcome."). This

comes from the text of § 112 ¶ 6 itself, which recognizes that means-plus-function claiming is invoked when the claim fails to recite a structure. 35 U.S.C. § 112 ¶ 6 ("An element in a claim for a combination may be expressed as a means or step for performing a specified structure ***without the recital of structure***, material, or acts and support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.") (emphasis added). Section 112 ¶ 6 is a different style of claim drafting, one where if an element is claimed solely by its function, then a § 112 ¶ 6 construction is required. Here, no element is claimed solely by its function—the claim language recites a structure that performs a function. Therefore, a § 112 ¶ 6 construction is not required.

Here, the claim language, specification language, and persons having ordinary skill in the art all recognize that an object detection sensor is a defined structure. First, the claim language—particularly when read in context with claim 10—illustrates that an object detection sensor is a defined structure. Claim 10 provides that the system includes "*at least one* ***object detection sensor*** *for detecting an object* in a vehicle path of the vehicle during the turn, said object detection sensor in electrical communication with said controller." Appx 10-11, '416 patent at 8:66-9:15. Then claim 11 refers to this structure again, claiming that the object detection sensor structure(s) perform two additional functions: (1) generating an object range signal and (2) generating an object angle signal. Thus, in the claims at issue, unlike most of the cases cited by Defendants, there is a clear structure set forth in the claim. *See, e.g.*, *Aristocrat Techs. Austl. PTY Ltd. v. Int'l Game Tech.*, 521 F.3d 1328 (Fed. Cir. 2008) (the claim limitation at issue was "game control means"); *see also Default Proof Credit Card Sys., Inc. v. Home Depot*, 412 F.3d 1291, 1293 (Fed. Cir. 2005) (claim limitation was a system comprising "means for dispensing at least one debit card for each transaction"); *ePlus, Inc. v. Lawson Software, Inc.,* 700 F.3d 509, 513 (Fed. Cir. 2012) (method claim limitation was "determining whether a selected matching item is available in inventory") .

Second, Defendants skirt the threshold question of whether § 112 ¶ 6 applies and instead jump to analyzing whether the "underlying structure of the sensor" meets the requirements "to perform the claimed function." *Supra* at 17. But the caselaw makes clear the question is simply whether an "object detection sensor" is a sufficiently definite structure to perform the claimed functions and recognized as such in the patent and by persons of skill in the art. The answer to both questions is definitively yes. And when there is sufficiently definite structure recited in the claims, there is no requirement to go spelunking in the inner componentry of a known class of structures.

Defendants do not contest that object detection sensors were known structures. *See supra* at 18 (describing that object detection sensors were known in the art at or before the time of the patent filing). And nor could they; the materials that Defendants' own expert cites treat object detection sensors as a class of known and definite structures. *See* U.S. Patent 7,420,502 (Messner Decl. Ex. D), Appx 234 at Fig. 2, Appx 247 at 2:28-31, and Appx 250 at 8:17-34 (describing the forward-looking radar—an object detection sensor—as a "unit"); Widmann, G., et al., *Comparison of Lidar-Based and Radar- Based Adaptive Cruise Control Systems*, SAE Transactions, 2000, Vol. 109, SECTION 7: JOURNAL OF PASSENGER CARS: ELECTRONIC AND ELECTRICAL SYSTEMS (2000), (Messner Decl., Exh E) at Appx 264 (describing an object detection sensor), Appx 265 at Fig. 3 (illustrating the detection sensors as structures inside the vehicle); Uno, S., et al., *Sophisticated CAN on Embedded Microcontrollers for Smart In-Vehicle Real-Time Control Systems*, SAE Transactions, Vol. 110, Section 7: JOURNAL OF PASSENGER CARS: ELECTRONIC AND ELECTRICAL SYSTEMS (2001), 550-555 (Messner Decl., Exh F) at Appx 281 (illustrating the radar unit, which "detect[s] the distance to the object ahead"—as a structural component of the ACC control system), Fig. 8.

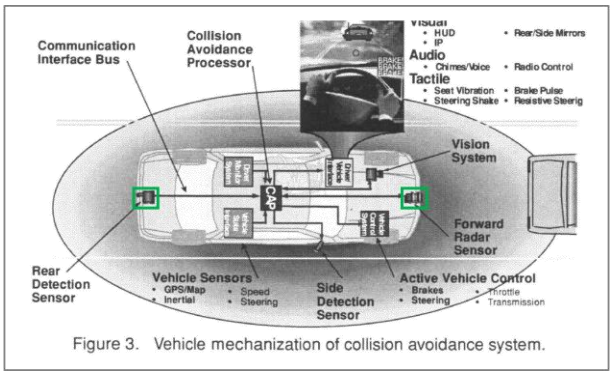


Figure 3. Vehicle mechanization of collision avoidance system.

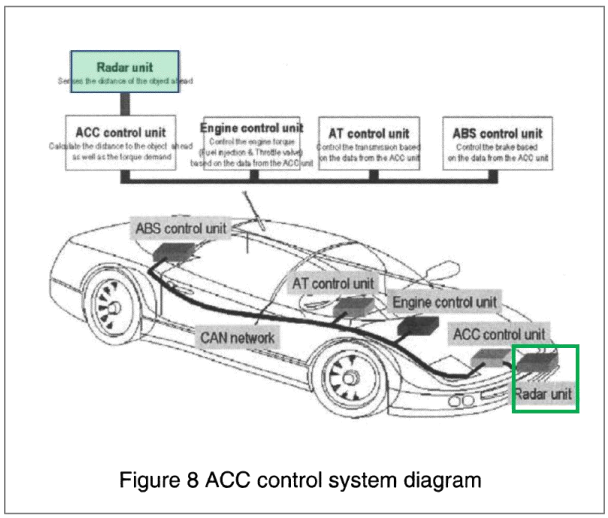


Figure 8 ACC control system diagram

Though Defendants try to subdivide the object detection sensor into sub-components to evade what is clear from the language of the patent, their own cited publications indicate that persons of skill in the art view object detection sensors as structural units.

Third, Defendants cite inapplicable caselaw that requires that the disclosed structure "be more than a general-purpose computer or module" and include "an algorithm for performing the claimed function." *Supra* at 19. But claim 11 isn't a generic module or computer, it is a specific structural component of an ACC system—an object detection sensor—that is designed, known, and included to perform the claimed functions of object detection, object range detection, and object angle detection. The cases Defendants cite as examples of needing more than a general purpose computer either contain claims devoid of any known structure, *see Williamson*, 792 F.3d at 1351-52 ("distributed learning control module" which had no defined meaning in the specification or the art); *Aristocrat Techs*, 521 F.3d at 1330, 1334 (construing a claim limitation, "control means," with no associated structure), or claim truly generic computers, *see Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1368 (Fed. Cir. 2008) (a generic bank computer performing a specialized function). The object detection sensor of claims 10 and 11 falls into neither of these buckets because it describes a known, specialized structure capable of performing the claimed functions.

Instead, claim 11 is analogous to *U.S. Well Services, LLC v. TOPS Well Services*, No. 3:19-cv-00237, 2020 WL 9439469 at *19 (S.D. Tex. Sept. 18, 2020), and the algorithm analysis is not triggered because the claim already includes a definite structure. In *U.S. Well Services*, the Defendants sought to "improperly attempt to import an 'algorithm' requirement without first determining whether the phrase is in means-plus-function form pursuant to Section 112, ¶ 6."[6] *Id.* The Court held that the term "thermal sensor," among other phrases, connotes "sufficiently definite structure to avoid invoking Section 112, ¶ 6." *Id.* The Court highlighted that the algorithm "analysis is triggered only where the limitation *is* a means-plus function limitation *and* the corresponding means is software." *Id.* Where the claim language, written description, and technical art describe the claimed specific "sensor" as structural, the "means is a structure rather than software and the limitation at issue is not a means-plus-function limitation." *Id.*

(b) Carrum's Proposed Construction Is Consistent with the Claim Language and the Written Description

Defendants argue that there is something amiss with Carrum's construction that two different object detection sensors could perform the two different claimed "means" functions. *Supra* at 19-21. But Carrum's proposed construction is consistent with the overall structure and language of claims 10 and 11. Claim 11 depends from claim 10. And claim 10 is clear that there can be more than one object detection sensor and refers to the plurality of object detection sensors with the same singular language of claim 11. Appx 10-11, '416 patent at 8:63-9:15 ("***at least one*** object detection sensor … ***said*** object detection sensor). Claim 11 simply adds limitations to the object detection sensors of claim 10 and there is nothing that indicates that the additional limitations of claim 11 (generating an object

[6] This is consistent with the analysis in *Williamson*. There, the Court first determined that the claim limitation did not "recite sufficiently definite structure" to overcome the means-plus-function presumption before moving onto the algorithm determination. *Williamson*, 792 F.3d at 1351-52.

range signal and generating an object angle signal) must be performed by the same object detection sensor, just that both functions must be performed.

In fact, the structure and language of the claims supposes the exact opposite. Claim 10's system contains one or more object detection sensors. Claim 11 is "the system of claim 10," including its multiple object detection sensors. And, contrary to Defendants' citations, the '416 patent's written description clearly contemplates that there could be more than one object detection sensor: "Sensor **220** may be used alone or in combination with other sensors, and depending on the type of sensor **220** used, sensor **220** may also ***be mounted alone or in multiples***." Appx 8, '416 patent at 4:50-53 (some emphasis added). The claim language allowing multiple object detection sensors, each of which could perform one of the claimed functions, is consistent with the language of the specification.

Similarly, Defendants attempt to sow confusion on how Carrum's proposed construction would read in the context of claim 11, but its construction is simple:

Claim 11	**Claim 11 with Carrum's Proposed Construction**
"The system of claim **10** wherein said object detection sensor includes means for generating an object range signal corresponding to a distance between the vehicle and the object; and an object angle signal corresponding to the object's angle in relation to the vehicle."	"The system of claim **10** wherein said object detection sensor includes an object detection sensor that generates a range signal corresponding to a distance between the vehicle and a target, and equivalents thereof, and an object detection sensor that generates the angle of the target relative to the vehicle, and equivalents thereof."

Defendants' proposed construction is simply too restrictive when read in light of the claim language, which expressly allows for multiple object detection sensors, and the '416 patent's written description, which expressly allows for multiple object detection sensors. Therefore, Carrum respectfully requests that, if the Court determines the claim is subject to § 112 ¶ 6, it adopt Carrum's proposed construction.

4. Defendants' Sur-Reply Position

Carrum argues that the "object detection sensor" of claim 10 provides structure for each of the claimed "means" within that sensor. But Carrum can point to nothing other than the functional language of the claims to describe those "means." Neither the claims nor patent specification define the structure of the claim "means" —whether it is hardware, software or some combination within the sensor of claim 10. In short, the "means" of claim 11 recites a black box within the "object detection sensor," and must be subject to § 112, ¶ 6.

The patent specification merely confirms that an object detection sensor, Sensor 220, includes the signal-generating functions of claim 11. The specification refers to "sensor 220 for generating a range signal corresponding to a distance between host vehicle 200 and a target" (Appx 8, '416 Patent at 4:23-25), and further states: "Sensor 220 may also be used . . . to gather additional information useful to controller 222. . .. This additional information includes the target angle of the object relative to vehicle 200." *Id.* 4:56-62. This does not however define structure for the claimed "means" with that object detection sensor.

According to Carrum, "there is no requirement to go spelunking in the inner componentry of a known class of structures." *Supra* at 23. But that's precisely where the recited "means" is found—within the claim 10 "object detection sensor." The patent describes Sensor 220 as "***any object detecting sensor known in the art***, including a radar sensor (e.g., doppler or microwave radar), a laser radar (LIDAR) sensor, an ultrasonic radar, a forward looking IR (FLIR), a stereo imaging system, or a combination of a radar sensor and a camera system. Appx 8, '416 Patent at 4:42-46. This description supports (and Carrum does not refute) Dr. Messner's testimony that object detection sensors known at the priority date were multi-component systems comprising hardware and software elements for performing a range of functions. Messner Decl., Appx 153-155, at ¶¶ 35-45. Conceding (as it must) that the "object detection sensor" was known in the art, Carrum must identify structure

for the ***claimed sub-component*** of that sensor. Carrum has not done that—and thus fails to rebut the presumption that § 112, ¶ 6 applies.

Ignoring the *quid pro quo* required by the use of the generic "means" term, Carrum argues that it need not identify corresponding structure because the "object detection sensor" itself is not a generic module or computer. But as noted, Dr. Messner testified that known object detection sensors were sophisticated computing devices that included, e.g., processors, computation modules and programming. *Id.* In other words, claiming an "object detection sensor" could be akin to claiming a computer because the specification does not limit the type of object detection sensor to exclude those with processors or computing modules. Therefore, the sensor itself is not sufficient structure to rebut the § 112, ¶ 6 presumption for its "means" sub-elements. See, e.g., *Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371 (Fed. Cir. 2009) (construing "means" elements of "server computer" under § 112, ¶ 6); *Aristocrat Techs. v. Int'l. Game Tech.*, 521 F.3d 1328, 1331 (Fed. Cir. 2008) (applying § 112, ¶ 6 to "means" elements of claimed "gaming machine").

The *U.S. Well Services* cited by Carrum does not hold otherwise. The claim limitation at issue recited "thermal sensors," but did not use the term "means" to trigger the presumption of § 112, ¶ 6. See *U.S. Well Services, LLC v. TOPS Well Services*, No. 3:19-cv- 00237, 2020 WL 9439469 at 52-58 (S.D. Tex. Sept. 18, 2020) (construing the phrase "wherein the variable frequency drive has/includes . . . ***thermal sensors*** monitored by a microprocessor . . . ."). The *U.S. Well Services* Court found that the term "thermal sensors" connotes sufficiently definite structure to avoid § 112, ¶ 6, but did not need to address sub-elements of those sensors. *Id.* Here, the claimed "means" are sub-elements of the "object detection sensor," and the § 112, ¶ 6 framework must apply. *See, e.g.*, *Auto-Dril, Inc. v. Nat'l Oilwell Varco, LP*, 304 F. Supp. 3d 587, 613 (S.D. Tex. 2018) (construing "sensor means" as a means-plus-function claim element governed by § 112(6)).

In sum, because Defendants' construction correctly applies § 112, ¶ 6, and specifies corresponding structure from the specification, the Court should adopt their construction— i.e., Sensor 220 functions (i) for generating a range signal corresponding to a distance between host vehicle 200 and a target, and (ii) for generating the angle of the target relative to the vehicle, and equivalents thereof.

B. "means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing" (Claim 12 term 1)

CLAIM TERM	CARRUM'S PROPOSED CONSTRUCTION	FCA & FORD'S PROPOSED CONSTRUCTION
Claim 12: "means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing"	Carrum does not believe this claim term is subject to construction under 35 U.S.C. § 112(f). In the alternative, Carrum proposes the following structure: "a controller that uses data to determine an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing and equivalents thereof"	Construction of this term is subject to pre-AIA 35 U.S.C. § 112(6), now 35 U.S.C. § 112(f). Function: "measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing" **Structure: Sensor 220 functions for generating a target range rate signal corresponding to a rate that the distance between host vehicle 200 and the target is changing, and equivalents thereof.**

1. Plaintiff's Opening Position

(a) "Controller" Is a Sufficiently Definite Structure

Defendants argue that two claim 12 terms require construction as means-plus-function claims: (1) "means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing," and (2) "means for determining a curvature corresponding to a radius of curvature of the vehicle path." *Supra* at II*;* D.I. 66. But like claim 11, claim 12 already includes a structure, a controller, that performs the claimed functions. Appx 11, '416 patent at 10:1-6

("The system of claim 11 wherein ***said controller*** includes both means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing and means for determining a curvature corresponding to a radius of curvature of the vehicle path.") (emphasis added). Because claim 12's language provides sufficient structure to perform the functions in claim 12, no construction under 112(6) is necessary. *Supra* at 7-12.

Like "sensor" above, controller is a term that has a defined meaning as a structure recognized by a person of ordinary skill in the art. The Mechanical Engineering Reference Manual (11th Ed.) describes a controller as a physical structure. Appx 129 ("The *controller (control element)* is the part of the control system that establishes the acceptable limits of performance, usually by setting its own reference inputs."). Scientific and industry publications contemporary with the '416 patent's filing date reinforce that a controller is a structural component widely known to a person of skill. For example, the term "controller" is used in contemporary academic automotive publications and these publications include diagrams with controllers similar to those in the '416 patent, indicating that a person of skill would recognize the controller in the '416 patent as a structural component. *See, e.g.*, Yahaya Md. Sam et al., LQR Controller for Active Car Suspension, IEEE, I-441 (2000), Appx 130-133; *see also*, Anton T. van Zanten, Evolution of Electronic Control Systems for Improving the Vehicle Dynamic Behavior, Robert Bosch GmbH (2002), Appx 134-142; Shaver Decl., Appx 18-20 at ¶¶ 30-35.

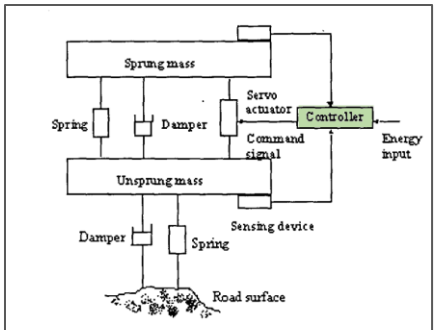
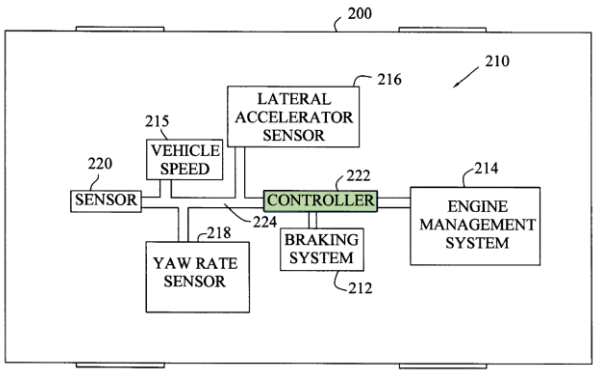


Figure 1 Actuator and sensor configuration in active suspension system.

The '416 patent's written description reinforces that a controller is a known and definite structure to persons of ordinary skill in the art. Shaver Decl., Appx 12-14, 18-20 at ¶¶ 1-19, 30-35. The specification defines a controller as "a microprocessor-based controller such as a computer having a central processing unit, random access and/or read-only memory, and associated input and output busses. Controller **222** may be a portion of a main control unit such as a vehicle's **200** main controller, or controller **222** may be a stand-alone controller." Appx 8-9, '416 patent at 4:66-5:4. This language shows that controllers are known, definitive structures in vehicles, as further illustrated in Figure 2 (highlighted in green below). *See*, Shaver Decl., Appx 18-19 at ¶¶ 31-32. Figure 2 is illustrative of the types of diagrams that are present in automotive publications used by persons of ordinary skill in the art and indicates the widely known, and structural, meaning of "controller."



And just like the "sensor" term, though Defendants' proposed alternative structure language for both claim 12 terms that would be confusing to the jury (Controller 222), the structure recognized by Defendants is the controller—the exact structure already set forth in claim 12. Moreover, the definition of "Controller 222" in the specification highlights why artificially narrowing the understood structure is nonsense: controller 222 can be either "stand-alone" or part of the "vehicle's main controller." Appx 9, '416 patent at 5:2-4. This language demonstrates both that a controller is a known and definitive structure in a vehicle that requires no further construction and illustrates the absurdity of Defendants' proposed construction. The specification and Defendants' own construction reinforce

the plain and ordinary meaning that a controller, as identified in claim 12 is a sufficiently definite structure to overcome the presumption of 112(6).

(b) Defendants' Proposed Structures Are Too Narrow and Confusing

Carrum proposes a structure definition of "a controller that uses data to determine an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing and equivalents thereof" for the function "measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing." Nothing in the specification of the '416 patent limits the way the controller obtains an object range rate—whether from a measurement from a sensor or through another method—and a controller is a sufficient structure to perform the function of measuring an object range rate.

For example, the '416 patent says that a sensor could measure an object range rate, Appx 8, '416 patent at 4:12-29, the patent also extensively discusses that the controller can *use* incoming data to make its own determinations. *See* Appx 8-10, '416 patent at 3:15-42; 6:1-6; 6:44-54; 7:19-31 (describing the controller determining the "location of target"). Further, the written description makes clear that the invention may be further modified within the spirit and scope of the disclosure and is meant to cover natural extensions and variations thereof. *Id.* at 7:65-8:5. A range rate is simply the rate that the distance between the vehicle and object is changing. *Id.* at 7:19-31. It takes two datapoints and the known time differential to calculate the range rate—a calculation that the controllers described in this patent are undoubtedly able to perform.

Moreover, as described above, the Defendants' proposed construction would be overly confusing to the jury. Like with the claim 11 term above, Defendants seek to introduce "random" (to a jury) numbers into the claim language. Should the Court adopt the Defendants' construction, the term "object detection sensor" should be substituted for "Sensor 220" as it is supported by the specification and would clearly convey to the jury what Carrum invented and claimed. *Supra* at 12-14.

2. Defendants' Answering Position

Carrum cannot overcome the presumption that § 112(f) applies to the "means for measuring an object range rate" of claim 12. Contrary to Carrum's contentions, the language of claim 12—and in particular, the recitation of "said controller" of claim 11—does not provide structure sufficient to perform the function of the recited "means." As with claim 11, the Court must look to the patent specification to identify the structure required to perform the claimed function. *Williamson*, 792 F.3d at 1351.

(a) Carrum Has Not Overcome the Presumption That § 112(f) Applies to the Recited "Means For Measuring" An Object Range Rate

Similar to its position on the "object detection sensor," Carrum argues that claim 12 includes the controller of claim 10, and that is the structure for performing the claimed functions. *Supra* at 29. Again, Carrum looks to known controllers to argue that recitation of the term"controller" alone provides sufficient structure. However, as with the sensors, Carrum attempts to rely on a complex and diverse category of structures known in the field as a "controller." The mere fact that a controller is a physical device says nothing about the components of the controller are or how they would operate or interact with other components. Messner Decl., Appx 155-156 at ¶¶ 46-49. Indeed, the definition that Carrum puts forth is illustrative— "The controller (control element) is the ***part of the control system*** that establishes the acceptable limits of performance, usually by setting ***its own reference inputs***." *Supra* at 30 (quoting The Mechanical Engineering Reference Manual (11th Ed.), Appx 129). That definition does not specify what constitutes well-understood functions of a controller, does not identify individual components of a controller, and does not describe what are "reference inputs" or outputs of a controller.

Moreover, the definition states that a controller is a part of a "control system" without any explanation of what the control system is or what it does. This is likely because a "controller," like a

sensor, was known to be a multi-component system or computer capable of various functions. Messner Decl., Appx 155-156 at ¶¶ 46-49.

As Carrum even acknowledges, the specification describes a controller as "***a microprocessor-based controller such as a computer*** having a ***central processing unit***, random access and/or read-only ***memory***, and associated input and output ***busses***. Controller **222** may be a portion of a main control unit such as a vehicle's **200** main controller, or controller **222** may be a stand-alone controller." Appx 8-9, '416 Patent at 4:66-5:4. This description illustrates the complexity of controllers known at the time of the patent filing, and demonstrates that recitation of the term "controller" alone does not specify whether (or how) a controller would perform the claimed function of "measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing." The language of claim 12 states nothing more than the controller of claim 10 includes some sort of "black box" for measuring an object range rate.

In fact, the '416 Patent does not describe a controller as performing the claimed function of measuring an object range rate. Rather, the specification states that Sensor 220 performs that function:

> System 210 also includes ***sensor 220 for generating*** a range signal corresponding to a distance between host vehicle 200 and a target, and ***a target range rate signal corresponding to a rate that the distance between host vehicle 200 and the target is changing.*** Controller 222 is in electronic communication with sensors 215, 216, 218, 220 over communication bus 224.

Appx 8, '416 Patent at 4:23-29. The controller (i.e., controller 222) is in electronic communication withsensor 220, which is the structure that measures the target range rate. Appx 3, '416 Patent at Fig. 2. The specification further explains "controller 222 obtains sensor data from sensor 220," which includes range rate:

> Upon detecting target 310, controller 222 verifies at step 420 that stopped vehicle 302 is valid by subjecting target 310 to persistence filtering. ***The persistence filtering includes . . . range rate*** (i.e., signal corresponding to a rate that the distance between vehicle 302 and target 310 is changing), the angle of target 310 and the ROC of turn 306 to verify target 310.

Appx 10, '416 Patent at 7:4-22; *see also* Appx 4-5, '416 Patent at Figs. 3, 4. This is consistent with the claim language—that the controller utilizes data from sensor 220, which measures the target range rate. That the controller would gather data from the sensor is also consistent with how one of ordinary skill in the art would understand the claimed controller and measuring "means" at the time of the patent filing. Messner Decl., Appx 155-156 at ¶¶ 46-49. Thus, based on the intrinsic record (and contrary to Carrum's position), the claimed "means for measuring an object range rate" is not the controller of claim 12, but rather a sensor, i.e., sensor 220, in communication with the controller.

(b) Carrum's Alternative Proposal Should Be Rejected as Inconsistent with the Intrinsic Record

Carrum's alternative construction also ignores the intrinsic record. Carrum's proposal substitutes a generic "controller" for the "means"— "***a controller*** that uses data to determine an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing and equivalents thereof." But that is not what the patent describes. *Blackboard,* 574 F.3d at 1383 ("The point of the requirement that the patentee disclose particular structure in the specification and that the scope of the patent claims be limited to that structure and its equivalents is to avoid pure functional claiming.") As discussed, the specification describes Sensor 220, not the controller, as measuring the target range rate.

Furthermore, if construed under § 112(f), the "means for measuring an object range rate" term should be limited to the structure disclosed in the specification that corresponds to the claimed function. *See Williamson*, 792 F.3d at 1351. Here, that is Sensor 220, and its disclosed function of generating a target range rate signal corresponding to a rate that the distance between host vehicle 200 and the target is changing. Appx 8 and 10, '416 Patent at 4:23-29; 7:4-22.

The Court should therefore adopt Defendants' construction, which specifies the disclosed structure—namely, the Sensor 220 function of generating a target range rate signal corresponding to a rate that the distance between host vehicle 200 and the target is changing, and equivalents thereof.

3. Plaintiff's Reply Position

Defendants' arguments on the two claim 12 terms fail for many of the same reasons that its claim 11 construction does, namely that claim 12 recites a sufficiently definite structure (a controller) to perform the claimed functions.

(a) A Controller Is a Sufficiently Definite Structure to Avoid § 112 ¶ 6

Defendants again skirt the threshold question of "whether 'the claim language, read in light of the specification, recites sufficiently definite structure to avoid § 112, ¶ 6.'" *MTD Products Inc. v. Iancu*, 933 F.3d 1336, 1342 (Fed. Cir. 2019) (citations omitted). Defendants contend that it does not matter that a controller is a known class of physical devices. *Supra* at 34. Instead, Defendants focus on the unremarkable fact that you can have different components within the well-defined and well-known category of controllers. But, the language of the claim, the written description, and persons of skill in the art all recognize controller as a specific, defined structure.

First, claim 12 depends from claims 10 and 11. Appx 10-11, '416 patent at 8:63-10:6. The structural component of claim 12 that "measur[es] an object range rate corresponding to the rate which the distance between the vehicle and the object is changing" is the controller first described in claim 10. Claim 10 describes a system with several components: an adaptive cruise control system, a controller, one or more lateral acceleration sensors, and one or more object detection sensors. *Id.* 8:63-9:15. Claim 10 makes clear that the controller—also of claims 11-14—is a device, describing it as: "a controller in communication with said adaptive cruise control system and capable of determining when the vehicle is in a turn, said controller operative to reduce the vehicle speed according to a vehicle position in the turn." *Id.*

Second, the patent's written description is consistent with the claims' description of the controller as a structural device capable of executing the claimed function. *See*, *e.g.*, Appx 3, '416 Patent Fig. 2 and Appx 8 at 3:54-55, 4:27-29 (discussing the controller as a device in communication with various sensors), and 4:66-5:8 (discussing the controller as a device). Defendants seek to reframe the question as what sub-components make up the controller, but that is not the question to be answered and only muddies the waters. *Supra* at 34 (arguing that the specification "does not specify whether (or how) a controller would perform the claimed function"). Defendants do not argue that a controller is not a known device or a structure. Therefore, § 112 ¶ 6 is inapplicable to the claims. *See Williamson*, 792 F.3d at 1348; *TriMed,* 514 F.3d at 1259-60.

Lastly, the Defendants' own expert's cited art supports Carrum's argument that a controller is a sufficiently definite structure and therefore the "means for measuring object range rate" limitation is not subject to § 112 ¶ 6. For example, "Comparison of Lidar-Based and Radar-Based Adaptive Cruise Control Systems," cited by Dr. Messner, illustrates the controller (control system) as a structural module (highlighted in blue below). *See* Widmann, G., et al. (Messner Decl. Ex. E), Appx 265-266 at Figs. 3 &5.

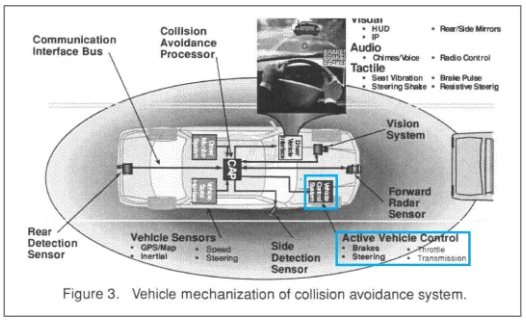


Figure 3. Vehicle mechanization of collision avoidance system.

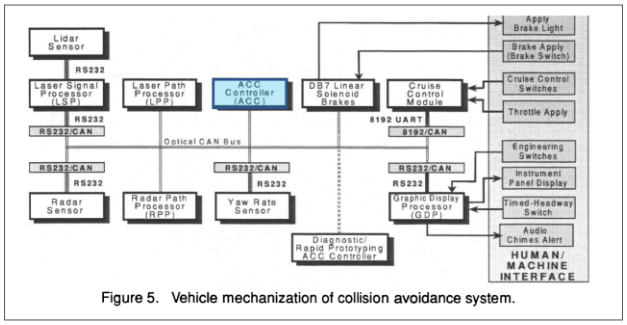


Figure 5. Vehicle mechanization of collision avoidance system.

Similarly, Dr. Messner's cited Ex. F refers to the control unit (the controller) as a structural component of a vehicle's adaptive cruise control system (highlighted in blue). Appx 281, '416 Patent at Fig. 8.

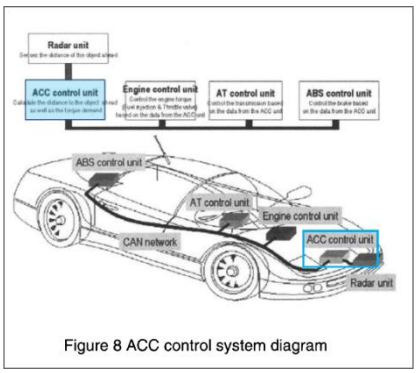


Figure 8 ACC control system diagram

(b) The Court Should Adopt Carrum's Proposed Construction

Defendants' position that sensor 220 is the structure that performs the "means for measuring an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing" function is divorced from both the text of the claim and the patent's written description. For example, as discussed above, the language of the claim is clear that the controller is the structure performing the function and the written description supports that the controller is a structural component of the system. *Supra* at 36-38. The Defendants argue that sensor 220 performs the function of "means for measuring an object range rate" and therefore Carrum's proposed construction should not be adopted. But the patent's description of sensor 220 does not align exactly with the function disclosed in the claim while the patent's description of a controller does (as a controller in communication with a sensor has a means for measuring). This Court should adopt Carrum's structure construction in the event it determines the claim is subject to § 112 ¶ 6.

The text of claim 12 is "[t]the system of claim 11 wherein ***said controller*** includes . . . means ***for measuring*** an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing." Appx 11, '416 patent at 10:1-5. The patent describes how the controller works in the turning and object detection scenarios in claims 10-12:

> Upon detecting object target **310**, controller 222 verifies at step 420 that stopped vehicle 302 is valid by subjecting target 310 to persistence filtering. The persistence filtering includes using vehicle's 302 yaw rate, yaw rate of change, speed, range (i.e., signal corresponding to a distance between vehicle 302 and target 310), range rate (i.e.,

> signal corresponding to a rate that the distance between vehicle 302 and target 310 is changing), the angle of target 310 and the ROC of turn 306 to verify target 310. Target 310 has a range rate equal to but opposite vehicle's 302 speed. By subtracting the range and angle data from vehicle's 302 speed, controller 222 can determine the actual speed and location of target 310. If the range decreases and the range rate changes inversely to vehicle 302's delta speed, then target 310 is stationary. If controller 222 determines that target 310 is stationary multiple times, then target 310 is considered to be verified.

Appx 10, '416 patent at 7:14-29. This paragraph describes the controller using various inputs (including range, speed, and angle data) to determine the actual speed and location of a target. The controller is using the range rate and calculating/verifying the range and range rate. This demonstrates the controller has a ***means*** for measuring the object range rate, whether that is from the disclosed calculations or from receiving a signal from a sensor, as discussed above. And there is nothing about the patent's description of sensor 220 that compels it to be the structure performing the claimed function; the patent does not use "measuring" to describe sensor 220's action. Appx 8, '416 patent at 4:23-29 ("System 210 also includes sensor 220 for generating . . . a target range rate signal"). And the patent makes clear that those generated signals are sent to the controller. *Id.* ("Controller 222 is in electronic communication with sensors 215, 216, 218, 220 over communication bus 224).

4. Defendants' Sur-Reply Position

For the "means" limitations of claim 12, Carrum also fails to overcome the presumption that § 112, ¶ 6 applies. Similar to its position on the "object detection sensor," Carrum argues that claim 12 includes the controller of claim 10, and that the controller itself provides structure for the recited "means." However, as with the "object detection sensor" of claim 11, the patent provides no indication of structure for the claimed "means" apart from the black box recitation in the claims.

Therefore, the Court must limit the claim 12 "means" to corresponding structure disclosed in the specification—that is, Sensor 220 or Controller 222.[7]

Carrum's arguments ignore that known controllers were microprocessor-based structures that could include programming. Messner Decl., Appx 155-156 at ¶¶ 46-49. Indeed, the patent specification describes the controller as "***a microprocessor-based controller such as a computer*** having a ***central processing unit***, random access and/or read-only ***memory***," that could be programmed to perform a range of functions. Appx 8-9, '416 Patent at 4:66-5:4. Thus, the term "controller" alone does not provide definite structure for the "means" of claim 12.

As discussed, the "means for measuring an object range rate" is sensor 220 communicating with the controller. Specifically, controller 222 is in electronic communication with sensor 220, which in turn provides the target range rate. Appx 8, '416 Patent at 4:23-29; Appx 10 at 7:4-22; *see also* Appx 3-5 at Figs. 2-4. Therefore, the Court should adopt Defendants' construction, which specifies as disclosed structure the Sensor 220 function of generating a target range rate signal corresponding to a rate that the distance between host vehicle 200 and the target is changing, and equivalents thereof.

[7] Carrum argues that identifying Sensor 220 or Controller 222 by the numbers provided in the specification would somehow be confusing to the jury. *Supra* at 32. But applying § 112, ¶ 6 requires reference to what is actually disclosed in the specification, and juries routinely consider patent figures and text including reference numbers.

C. "means for determining a curvature corresponding to a radius of curvature of the vehicle path" ('416 patent, claim 12)

CLAIM TERM	CARRUM'S PROPOSED CONSTRUCTION	FCA & FORD'S PROPOSED CONSTRUCTION
Claim 12: "means for determining a curvature corresponding to a radius of curvature of the vehicle path"	Carrum does not believe this claim term is subject to construction under 35 U.S.C. § 112(f). In the alternative, Carrum proposes the following structure: "a controller that uses data from vehicle sensors to determine the radius of curvature, and equivalents thereof"	Construction of this term is subject to pre-AIA 35 U.S.C. § 112(6), now 35 U.S.C. § 112(f). Function: "determining a curvature corresponding to a radius of curvature of the vehicle path" **Structure: Controller 222 using data obtained from vehicle 302 to determine a radius of curvature, and equivalents thereof.**

1. Plaintiff's Opening Position

Carrum proposes a structure definition of "a controller that uses data from vehicle sensors to determine the radius of curvature, and equivalents thereof" for the function "determining a curvature corresponding to a radius of curvature of the vehicle path." *Supra* at II; D.I. 66. The '416 patent definition links the claimed function—determining a curvature to a radius of curvature of the vehicle path—with the controller structure. *See* Appx 9, '416 patent at 6:1-11 ("Controller **222** also uses other data obtained from vehicle **302** to predict whether vehicle **302** is in a turn. . .. Vehicle speed data may be combined with lateral acceleration data to indicate the radius of curvature (ROC) or a road, i.e., how tight the turn is."). Plainly, the specification links the controller with the function of determining the radius of curvature.

Similar to the other terms above, the Defendants' proposed construction utilizes the term "controller" as its structure but restricts the term with a number ("222") used in the written description to make the examples more understandable. But controller 222 is not a particular type of structure. In fact, the written description makes clear Controller 222 may be any "microprocessor-based controller such as a computer having a central processing unit, random access and/or read-only member, and

associated input and output busses. Controller **222** may be a portion of a main control unit such as vehicle's **200** main controller, or controller **222** may be a stand-alone controller." Appx 8-9, '416 patent at 4:66-5:04. That Controller 222 can be either Controller 222 or Vehicle 200's main controller highlights the absurdity of Defendants' construction. The structure is simply a controller (the language used in the claims). The number is there to aid a person of ordinary skill in the art reading a patent's examples. But including the numbering would make the claim unduly difficult for a jury to navigate. *See Power-One*, 599 F.3d at 1348.

2. Defendants' Answering Position

Carrum also fails to overcome the presumption that § 112(f) applies to the "means for determining a curvature" of claim 12. According to claim 12, the recited "means" is an element of "said controller" of claim 11, which depends from claim 10. However, as with the "means for measuring an object range rate," the mere recitation of a controller does not specify sufficient structure to perform the claimed function. Again here, the Court must look to the patent specification for the disclosed structure. *Williamson*, 792 F.3d at 1351.

First, as discussed above, a "controller" was a known multi-component system or computer that could perform various functions. Messner Decl., Appx 155-156 at ¶¶ 46-49. Carrum's proposal merely replaces the term "means" with a generic "controller," which connotes nothing more than a "black box" for performing the recited functions. But, as detailed above, the patent specification confirms that a "controller" is a microprocessor-based computing device that can be programmed to perform any of wide range of functions. In effect, the term "controller" alone recites a general-purpose computer. But that does not suffice to rebut the presumption that § 112(f) applies. The fact that one of ordinary skill in the art *could program* a computer to perform the recited functions does not create structure where none otherwise is disclosed. *Williamson*, 792 F.3d at 1351 (citing *Function Media, L.L.C. v. Google, Inc.*, 708 F.3d 1310, 1319 (Fed. Cir. 2013)). Thus, the "controller" term fails to recite

sufficiently definite structure, and Carrum has not rebutted the presumption that recited means-plus-function limitation is subject to § 112(f).

Second, under controlling Federal Circuit authority, Carrum's proposed alternative also fails. The function recited in a means-plus-function limitation subject to § 112(f) must have a corresponding disclosure in the specification—that is, an algorithm for performing the claimed function. *Blackboard*, 574 F.3d at 1382-83. The algorithm need not be a mathematical formula; it can be in prose, as a flow chart, or some other expression that describes sufficient structure. *Williamson*, 792 F.3d at 1352. What's key is that the structure disclosed in the specification must be more than a general-purpose computer. *Id.*

However, Carrum's alternative § 112(f) construction is unbounded by the specification. Carrum proposes "***a controller*** that uses data to determine an object range rate corresponding to the rate in which the distance between the vehicle and the object is changing and equivalents thereof." This proposal merely rewrites the claimed function, and ignores structure (i.e., an algorithm) found in the specification for performing the claimed function.

The specification describes controller 222 using data obtained from vehicle 302 to determine a radius of curvature:

> ***Controller 222 also uses other data obtained from vehicle 302*** to predict whether vehicle 302 is in a turn. This data includes . . . vehicle's 302 speed, which is obtained from vehicle speed sensor 215 . . . Vehicle speed data may be combined with lateral acceleration data ***to indicate the radius of curvature (ROC)*** or a road, i.e., how tight the turn is.

Appx 9, '416 Patent at 6:1-11; *see also* Appx 8 at 3: 3:37-39 ("estimating the radius of curvature of the vehicle's path based on the vehicle's speed and lateral acceleration"); Appx 3-5, '416 Patent at Figs. 2-4). Thus, the structure, or algorithm disclosed in the specification for performing the claimed function is programming of controller 222—not any controller known in the art, as Carrum contends.

In sum, Carrum again proposes a construction untethered to the intrinsic record, which should be rejected. By contrast, Defendants have proposed the claimed function and the specific structure disclosed in the specification—controller 222 using data obtained from vehicle 302 to determine a radius of curvature, and equivalents thereof.

3. Plaintiff's Reply Position

For all the reasons set forth above, this claim limitation is also not subject to § 112 ¶ 6 because "controller" provides sufficiently definite structure to perform the claimed function. *See supra* at 36-38. But should the Court decide that this limitation is subject to § 112 ¶ 6, it should adopt Carrum's proposed construction because it is consistent with the language of the claim and the patent's written description.

As discussed for the object detection sensor of claim 11 above, because controller is a sufficiently definite structure, the analysis does not begin with the algorithm question it begins by evaluating the structure. *Supra* at 24-25. Nor is a controller a general-purpose computer. It is a specialized structure within an automobile that has defined functions set forth in the written description of the patent, including the second claim 12 limitation. Appx 9, '416 patent at 6:1-11 (describing that the controller uses various data to "indicate the radius of curvature").

But more than that, Defendants' proposed construction is non-sensical. It imports unnecessary numbers into the claim language while implicitly recognizing that the controller described in the patent's written description and claims is capable of performing the claimed function. None of the numbers associated "sensor" or "controller" used in the patent's written description should be included as part of the structure construction. First, the Figure 2 block diagram doesn't include those numbers. Second, the numbers in the written description are included for ease of understanding the examples but would be confusing to a jury as part of the claim language. Third, numbers are frequently included in the written description to make examples easier to follow, but not included in claim

constructions, even when interpreted under § 112 ¶ 6. *Compare MobileMedia Ideas, LLC. v. Apple Inc.*, 178 F.Supp.3d. 209, 220-21 (D. Del. 2016) (construing structure to be "RF signal processing circuitry") *with* Appx 289, U.S. RE39231 E1 at 2:29-47 (referring to "RF signal processing portion **10**").

When Defendants' proposed structure is rewritten without the improper reference to example numbers, it reads as "controller using data from vehicle to determine a radius of curvature, and equivalents thereof." Carrum's proposed construction reads "a controller that uses data from vehicle sensors to determine the radius of curvature, and equivalents thereof." However, should the Court find that § 112 ¶ 6 applies, Carrum would agree to the following construction: "a controller using data from a vehicle to determine a radius of curvature, and equivalents thereof." Once the confusing and unnecessary numbers are removed, there is little difference between the parties' constructions. For these reasons, Carrum requests the Court find that claim 12 is not subject to § 112 ¶ 6 or, in the alternative, adopt Carrum's proposed constructions.

4. Defendants' Sur-Reply Position

The "means for determining a curvature" is a black box component of the "controller," such that the mere recitation of a controller does not specify sufficient structure—it could be any controller known in the art, as Carrum concedes. *Supra* at 37-38. The specification explains that controller 222 uses data obtained from vehicle 302 to determine a radius of curvature. Appx 9, '416 Patent at 6:1-11; *see also* Appx 8, '416 Patent at 3:3:37-39; and Appx 3-5 at Figs. 2-4. Therefore, the corresponding structure for the "means for determining a curvature" is programming within ***controller 222***—that is, as Defendants propose, controller 222 using data obtained from vehicle 302 to determine a radius of curvature, and equivalents thereof.

V. CONCLUSION

A. Plaintiff's Conclusion

Carrum respectfully requests that the Court determine claims 11 and 12 are not subject to § 112 ¶ 6 or, in the alternative, adopt Carrum's proposed structure constructions.

B. Defendants' Conclusion

Defendants respectfully request that the Court construe the "means" of claims 11 and 12 under § 112, ¶ 6, and adopt Defendants' proposed constructions.

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Respectfully submitted,

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